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COOPERATIVE EXTENSION WORK IN AGRICULTURE AND HOME ECONOMICS.

U. S. DEPARTMENT OF AGRICULTURE
AND STATE AGRICULTURAL COLLEGES
COOPERATING.

STATES RELATIONS SERVICE, OFFICE
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HOME CANNING INSTRUCTIONS.

METHODS AND DEVICES.

There are at the present time five methods of canning foodstuffs, as classified for convenience in the work of home canning clubs. These are as follows:

1. The open-kettle, or hot-pack, method.
2. The intermittent, or fractional-sterilization, method.
3. The cold-water method.
4. The cold-pack, single-period method.
5. The vacuum-seal method.

(1) The oldest and most commonly used method is known as the *open-kettle, or hot-pack, method.* This method requires the complete cooking of food products in a vessel before packing or filling the cans and final sealing. All packing of products is done after sterilization has been completed, hence the possibility of new spores and bacteria entering the jars before sealing is always present.

This method will succeed very well with general fruits, but is a failure when applied to the general vegetables, greens, sweet corn, and meats. It is laborious, and discourages much canning, consequently a considerable waste of fruits and vegetables is more in evidence all over the country.

(2) The intermittent, or fractional-sterilization, method of canning fruits, vegetables, and meats is a very successful method, as far as the handling and packing of the product and the effect upon bacteria, spores, and other forms of germs are concerned. By this method complete sterilization is effected, but in the matter of the required three periods of sterilization on three different days, and three liftings of jars in and out of the sterilizer, it is unsatisfactory and quite impractical, in that it requires too much time, too much fuel and heat, consumes too much energy on the part of the club member, farmer, or housewife, and usually overcooks the products.

This method does not encourage the saving of the large amount of inexpensive and most important foods, in the form of vegetables, such as greens, sweet corn, tomatoes, beets, etc.

(3) What is sometimes called the "cold-water" method of canning should not be confused with the "cold-pack" method. The cold-water method is often used in connection with the canning of rhubarb, green gooseberries, and a comparatively few other sour-berry fruits.

We would not recommend this method as practical in club canning, for the reason that most of these products will need to be cooked before they can be used, and it is a saving of both time and labor to do the necessary cooking while the product is being canned.

Recipe, "cold-water" method.—If the "cold-water" method is used, we would suggest that the product be thoroughly washed, placed in a strainer, scalding water poured over it, and the product then packed at once, in practically a fresh state, in the jars, and clean, cold water applied

until the jars are filled. If these steps are taken carefully and quickly, the method, in most cases, will be successful with such products as rhubarb and gooseberries.

(4) The method now in general use by the members of the Home Canning Club Work, as well as many adults all over the United States, is known as the "cold-pack" method of canning. This simply means that the products are packed cold in their fresh and natural state in the glass jars or containers. To the fruits, hot sirup is applied; to the vegetables and greens, hot water and a little salt is added. Then the sterilization is done in the jars or containers, after they are partially or entirely sealed, making it practically impossible for bacteria or spores to enter after the product has once been carefully sterilized or cooked. In following this method vegetables should first be blanched in boiling water or live steam, then *quickly plunged* into cold water and the skins removed, or the products sized. The products are then packed in containers and sterilized according to the instructions and recipes given in leaflets NR 23, 24, 28, 33, 34, 37 of this series and any others prepared for the home canning work.

By this "cold-pack" or cold-fill method of canning, all food products, including fruits, vegetables, and meats, can be successfully sterilized in a single period, with but *one handling* of the product in and out of the canner. The "NR" recipes apply equally well to homemade outfits as they do to the five types of commercial canners. Practically every type of fruit jar manufactured can be successfully handled by this method.

(5) A development of importance to the home canning business is the introduction of specially made jars. After the food product has been blanched, cold dipped, and cooked enough to make it ready for table use, it can be packed in the jars and the vacuum produced. When the jars are perfectly made and the work properly done this method of canning is successful, and can be carried out by the average housewife or club member.

CANNING EQUIPMENT.

The canning outfits available for the sterilization of food products during the canning season may be divided into five general types:

1. *Homemade outfits*, such as wash boilers, tin pails, milk cans, washtubs, and lard pails. These are made especially convenient and efficient when provided with false bottoms, lifting handles, and tight-fitting covers.

2. *Hot-water bath commercial outfits.*—These are constructed usually for out-of-door work, and have a sterilizing vat, lifting trays, fire box, and smoke pipe, all combined in one piece. They are light and convenient, and are planned as portable outfits. They contemplate that the sterilization of the products will be done in completely sealed tin cans or partially sealed glass jars immersed in boiling water. The only advantage of these outfits over the homemade device is that they are made for convenience, and have all the necessary equipment for operation. Both the homemade and hot-water commercial canners are classed as *hot-water bath outfits.*

3. *Water-seal outfits.*—These belong to a type of canning outfit having an inner seal and jacket, and a cover that passes into the seal and between the outer and inner jackets, thus making three tin or galvanized surfaces, and two water columns between the sterilizing vat and the outer surface of the canner. The chief value of this type of canner is in the fact that you can maintain a higher temperature than with the hot-water bath outfits. This is especially valuable in the canning of vegetables or meats, where the higher temperature means so much in the saving of time, fuel, and energy in effecting a complete sterilization of the food products.

4. *Steam-pressure outfits.*—Canners of this type are made to carry from 5 to 30 pounds of steam pressure and are equipped with steam-tight sterilizer, lifting crate, thermometer or pressure gauge, safety valve, and steam pet cock. The pressure canner may be easily regulated so

as to maintain different temperatures and thus adapt them to various vegetables and food products.

5. *Aluminum pressure cooker.*—This is a combination outfit which is used for both general cooking purposes and the canning of fruits, vegetables, and meats. Because of its general utility in the home it can be made of great labor-saving value to the housewife for the cooking of all kinds of meats, vegetable dinners, soups, gravies, and stews. It is considered the quickest canning outfit on the market. This is due to the facts that it is made entirely of aluminum and transmits heat very quickly, and will carry as high as 30 pounds of steam pressure. Its general make-up and necessary parts are practically the same as in other steam-pressure outfits made of steel, iron, or heavy tin.

NOTE.—The time schedule for sterilization in all of our recipes is made to accommodate the five distinct types of home canners. The homemade and hot-water commercial outfits are classed under the head of "Hot-water bath outfits." The other three are classed in the order given above and under the same names, thus making the five classes with different time requirements.

TEMPERATURE FOR BOILING WATER AT DIFFERENT ALTITUDES.

Water boils at sea level at 212° F. As the altitude increases, the temperature at which water will boil gradually decreases. The following table is intended as a guide to determine the increase of time required for the sterilization of foodstuffs in the canning process at various altitudes:

500 feet above sea level, 211° F.
1,000 feet above sea level, 210° F.
2,000 feet above sea level, 208° F.
3,000 feet above sea level, 206° F.
4,000 feet above sea level, 204+° F.
5,000 feet above sea level, 202+° F.
6,000 feet above sea level, 201° F.
7,000 feet above sea level, 199° F.

The time-table given in these instructions is based upon the first altitude given—500 feet above sea level. For every 4,000 feet increase in altitude it will be well to add 25 per cent to the time requirements given in the recipes or time schedule for the canning of all kinds of fruits, vegetables, greens, and meats. Variations from this schedule will be necessitated by extreme variations in the condition of the products to be canned.

For specific instructions in tipping and capping of tin cans, canning of windfall apples, sterilizing apple cider, making sirup from sweet cider, recipes for fruits and vegetables, send to the United States Department of Agriculture, States Relations Service, Office of Extension Work, North and West, and ask for the NR series of Home-Canning Club instructions.

CONTAINERS.

GLASS JARS.

It is conceded by most women that glass jars are the most desirable and economical for use in canning for home use, as they can be used from year to year, or indefinitely, by simply adding new rubbers and tops each year. Practically all of the various types of glass jars available on the market can be successfully used in the canning of fruits, vegetables, and meats by the "cold-pack" method outlined in these instructions.

In the handling of all glass-top jars with the top and clamp springs it is important to remember that the rubber, cap, and top spring are put in place, while the lower clamp spring is left up, or raised, during the entire period of sterilization and then lowered and completely closed after sterilization.

In handling the screw-top jar it is important to remember that the rubber and top are put in place and the top turned until it touches the rubber, sealing the jar partially, but not so closely as to prevent the escape of excessive or expanded air.

TIN CANS.

When the canning work has developed to such an extent that a considerable portion of the products will need to be sold on the general market and in competition with commercially canned food products, the tin cans are considered most practical because of their convenience in storage and handling through the various transportation channels.

When canning vegetables and meats, it is desirable to use the enameled or lacquered cans. This, however, is not necessary for all products, especially fruits, when the work is carefully supervised and the blanching, cold dipping, and general rules for handling the food products are carefully followed. Ask for United States Department of Agriculture, Office of Extension Work, North and West, Circular NR 22, on the use of tin cans, tipping, and capping.

MAKING OF BRINE AND SIRUPS.

The following table shows the proportions of salt and water required to make brines of given percentage strengths:

Table for making brines.

Salt.	Water.	Per cent.
1 pound	12 gallons	1
2 pounds	12 gallons	2
1 pound	4 gallons	3
2 pounds	4 gallons	6
2 pounds	3 gallons	8
5 pounds	6 gallons	10
5 pounds	4 quarts	15
1 pound	3 quarts	16
1 pound, 4 ounces	3 quarts	20
1 pound, 9 ounces	3 quarts	25

SUGAR SIRUPS.

Sugar sirups are made by boiling sugar and water together to a certain density. This density, expressed as "degree," or "per cent," is measured by a density gauge, and also by what is sometimes termed a "mental-finger gauge," which furnishes, of course, only an approximate estimate of the density or "concentration" of the sirups.

The following sirup table is computed on the number of pounds of sugar in 100 pounds of solution, and, therefore, is called a "per cent table":

Table for making sirups.

Sugar.	Water.	Per cent.
1 pound	3 quarts	16
1 pound, 4 ounces	3 quarts	20
1 pound, 9 ounces	3 quarts	25
2 pounds, 8 ounces	4 quarts	30
1 pound	1½ quarts	32
2 pounds, 3 ounces	3 quarts	35
2 pounds, 8 ounces	3 quarts	40
2 pounds, 13 ounces	3 quarts	45
3 pounds, 2 ounces	3 quarts	50
3 pounds, 7 ounces	3 quarts	55
3 pounds, 12 ounces	3 quarts	60

The formula much used in the West for sirup is 3 quarts of sugar to 2 quarts of water, boiled to a thin, medium-thin, medium-thick, or thick sirup. The formula sometimes called the Eastern formula is 3 quarts of water to 2 quarts of sugar, boiled to a thin, medium-thin, medium-thick, or thick sirup.

APPROXIMATE DENSITY TERMS EXPLAINED.

1. *Thin sirup* is sugar and water boiled sufficiently to dissolve all sugar; but is not sticky.

2. *Medium thin* sirup is that which has begun to thicken and becomes sticky when cooled on the finger tip or spoon.

3. *Medium thick* sirup is that which has thickened enough to roll or pile up over the edge of a spoon when you try to pour it out.

4. *Thick sirup* is that which has become so thick that it is difficult to pour out of a spoon or container (not sugared).

Thin sirups are used for all sweet fruits that are not too delicate in texture and color, such as cherries, peaches, apples, etc.

Medium-thin sirups are used in the canning of the medium-sweet fruits, such as blackberries, currants, dewberries, huckleberries, raspberries, etc.

Medium-thick sirups are used in the canning of all sour fruits, such as gooseberries, apricots, sour apples, etc., and delicately colored fruits, such as strawberries and red raspberies.

Thick sirup is used in preserving and in making all kinds of sun preserves.

USEFUL TABLES.

Weights of cans and cases.

1,000 No. 2 empty tin cans will weigh 212 pounds.
1,000 No. 3 empty tin cans will weigh 310 pounds.
1 case (wood) for 24 empty No. 2 tin cans will weigh 13 pounds.
1 case (wood) for 24 empty No. 3 tin cans will weigh 17 pounds.

The following table will show approximately how many Nos. 2 and 3 cans can be filled from a bushel of various fruits and vegetables:

Number of cans per bushel of various fruits and vegetables.

Product.	No. 2 cans (pints).	No. 3 cans (quarts).	Product.	No. 2 cans (pints).	No. 3 cans (quarts).
1 bushel windfall apples	30	20	1 bushel tomatoes	22	15
1 bushel standard peaches	25	18	1 bushel shelled lima beans	50	30
1 bushel pears	45	30	1 bushel string beans	30	20
1 bushel plums	45	30	1 bushel sweet corn	45	25
1 bushel blackberries	50	30	1 bushel shelled peas	16	10
1 bushel windfall oranges (sliced)	22	15	1 bushel sweet potatoes	30	20
1 bushel windfall oranges (whole)	35	22			

IMPORTANT CANNING SUGGESTIONS.

FACTS FOR HOME CANNING.

Do not combine two recipes or two sets of instructions in canning. If you do, you will fail.

Remember that efficient heat, plenty of clean water, and complete sterilization are absolutely necessary.

The "cold-pack" method of canning does not mean that the canning is done without heat, but simply means that the final sterilization is done after the jar or can has been completely filled, the rubber and cap put in place, or the tin can completely sealed.

When using glass jars always utilize the jars you have on hand, but when you buy new jars, buy the best. They are the cheapest in the long run. No glass jar with metal or rubber in direct contact with the food product is desirable unless the cap is enameled, lacquered, or vulcanized. Glass jars should be thoroughly cleaned and should be taken directly from hot water to be filled.

When coring, peeling, and slicing apples, the apple product should be dropped in a vessel containing cold, slightly salted water, in order to keep the product from discoloring before packing.

Canned products in glass jars, if exposed to light, will bleach, fade, and sometimes deteriorate in food value; hence the necessity of wrapping in paper.

If vegetables and greens are blanched in a steamer and then plunged into cold water, it is perfectly safe to use tin cans; however, enameled or lacquered cans are always the safest.

Do not can rhubarb in tin cans unless you use at least 30° density sirup and enameled cans.

Products canned in tin should be emptied into glass, porcelain, china, or stoneware as soon as the can is opened. Pack jars and tin cans thoroughly, but avoid overpacking tin cans with products such as corn, peas, and lima beans, as all of these expand somewhat during sterilization.

Avoid using too much salt in the canning of vegetables, greens, tomatoes, and sweet corn. A little sugar added before sterilization will improve the product and sometimes shorten the time required for processing.

Avoid destroying the vegetable or volatile oils in products such as greens, cabbage, brussels sprouts, and cauliflower when canning, but be sure to eliminate the excessive acids. This is done by blanching the product in a steamer or large dishpan (over a false bottom), with just a little water beneath the greens.

When canning windfall apples whole, sliced, or quartered, remember that they must be sterilized enough to keep, but avoid overcooking to reduce to apple sauce or tarnish color of pulp.

Enough, convenient, and efficient canning equipment is important to success. When using steam-pressure outfits, remember that too much pressure is destructive to the value of all food products.

Begin your canning work with a small quantity and with one product the first day. Take time to do your work well, then test the products before you can a large quantity.

Standardize your products, and if you are to market your canned goods protect your standard and your trade-mark faithfully from year to year, through a uniform and reliable product as well as pack.

In many instances it is important that you work or can with a homemade outfit first, then you will be in better position to determine what kind of commercial outfit you can best use in your work. The fact that an outfit is called a home-canning outfit and is very favorably advertised, and that the company promises much, does not necessarily mean that it is the kind of outfit you should buy. Investigate carefully before you buy. No commercial canner has been selected or recommended by the Department of Agriculture as the only reliable device. Buy an outfit that will do your canning by the one-period method—one that will lessen your labors, save your time, and increase your efficiency. An outfit which requires increased time and labor should be avoided.

Business organization and management is nowhere more important than in canning operations. The proper placing of tables with relation to canner, water, fuel, and source of vegetables and fruits, the arrangement of utensils, and the system with which the canning work is executed are all vital matters.

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